UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES
AND TOXIC SUBSTANCES

Note to Reader
January 8, 1998

Background: As part of its effort to involve the public in the implementation of the Food Quality Protection Act of 1996 (FQPA), which is designed to ensure that the United States continues to have the safest and most abundant food supply. EPA is undertaking an effort to open public dockets on the organophosphate pesticides. These dockets will make available to all interested parties documents that were developed as part of the U.S. Environmental Protection Agency's process for making reregistration eligibility decisions and tolerance reassessments consistent with FQPA. The dockets include preliminary health assessments and, where available, ecological risk assessments conducted by EPA, rebuttals or corrections to the risk assessments submitted by chemical registrants, and the Agency's response to the registrants' submissions.

The analyses contained in this docket are preliminary in nature and represent the information available to EPA at the time they were prepared. Additional information may have been submitted to EPA which has not yet been incorporated into these analyses, and registrants or others may be developing relevant information. It's common and appropriate that new information and analyses will be used to revise and refine the evaluations contained in these dockets to make them more comprehensive and realistic. The Agency cautions against premature conclusions based on these preliminary assessments and against any use of information contained in these documents out of their full context. Throughout this process, If unacceptable risks are identified, EPA will act to reduce or eliminate the risks.

There is a 60 day comment period in which the public and all interested parties are invited to submit comments on the information in this docket. Comments should directly relate to this organophosphate and to the information and issues available in the information docket. Once the comment period closes, EPA will review all comments and revise the risk assessments, as necessary.

These preliminary risk assessments represent an early stage in the process by which EPA is evaluating the regulatory requirements applicable to existing pesticides. Through this opportunity for notice and comment, the Agency hopes to advance the openness and scientific soundness underpinning its decisions. This process is designed to assure that America continues to enjoy the safest and most abundant food supply. Through implementation of EPA's tolerance reassessment program under the Food Quality Protection Act, the food supply will become even safer. Leading health experts recommend that all people eat a wide variety of foods, including at least five servings of fruits and vegetables a day.

Note: This sheet is provided to help the reader understand how refined and developed the pesticide file is as of the date prepared, what if any changes have occurred recently, and what new information, if any, is expected to be included in the analysis before decisions are made. **It is not meant to be a summary of all current information regarding the chemical.** Rather, the sheet provides some context to better understand the substantive material in the docket (RED chapters, registrant rebuttals, Agency responses to rebuttals, etc.) for this pesticide.

Further, in some cases, differences may be noted between the RED chapters and the Agency's comprehensive reports on the hazard identification information and safety factors for all organophosphates. In these cases, information in the comprehensive reports is the most current and will, barring the submission of more data that the Agency finds useful, be used in the risk assessments.

Jack E. Housenger, Acting Director
Special Review and Reregistration Division

MEMORANDUM

DATE: October 7, 1998

SUBJECT: OXYDEMETON-METHYL: HED Risk Assessment and Disciplinary Chapters for the Reregistration Eligibility Decision (RED) Document. Chemical No. 058702. Case No. 0258. Barcode D235118.

FROM: Paula A. Deschamp, Risk Assessor
Reregistration Branch 2
Health Effects Division (7509C)

THROUGH: Alan P. Nielsen, Branch Senior Scientist
Reregistration Branch 2
Health Effects Division (7509C)

TO: Cathy Monk/Kathleen Meier
Reregistration Branch II
Special Review and Reregistration Division (7508W)

Attached is HED's risk assessment, disciplinary science chapters and other supporting documents for the Oxydemeton-methyl Reregistration Eligibility Decision (RED) Document as follows:

HED Risk Assessment. Paula A. Deschamp (10/7/98)
Revised Report of the Hazard Identification Assessment Review Committee.
Robert F. Fricke and Jess Rowland (5/7/98)
Product and Residue Chemistry Chapters for the RED. Paula A. Deschamp (12/02/97)
Toxicology Chapter. Robert F. Fricke (9/22/98)
Occupational and Residential Exposure Assessment. Kelly O'Rourke (08/3/98)
Dietary Exposure and Risk Estimates for Reregistration. Richard Griffin (5/26/98)
Incident Report. Jerome Blondell and Monica Spann (9/29/97)

Oxydemeton-methyl is an organophosphorus insecticide. Cumulative risk assessment considering risks from other pesticides having a common mechanism of toxicity is not addressed in this document.

HED's Hazard Identification Assessment Review Committee (HIARC) reviewed the toxicological database for oxydemeton-methyl and toxicological endpoints selected for acute and chronic dietary as well as occupational (dermal and inhalation) exposure risk assessment on July 1 and 2, 1997 (memorandum dated July 24, 1997) and again on February 25, 1998 (memorandum dated May 7, 1998). The later report supersedes the previous Committee report with the inclusion of a 7-day dermal toxicity study in the rat submitted March, 1998. This later report also stands as HED's documented response to Gowan's submission dated January 6, 1998 "Registrant Response to the USEPA Hazard Identification Report for Oxydemeton-methyl".

In HED's FQPA Safety Factor Recommendations (Combined Report of the HAIRC and Safety Factor Committee and its Recommendation for the Organophosphates) dated August 6, 1998 is was concluded that the 10x FQPA safety factor be retained because of a concern for possible adverse heritable effects based on the *in vivo* mouse spot test which was positive for the induction of somatic cell mutations following prenatal administration. Also, there was clear evidence of DNA strand breaks in rat testes cells in an *in vitro* alkaline elution assay (not confirmed *in vivo*). Based on this, HIARC recommended a mouse specific locus test.

To address acute dietary exposure and risk concerns delineated in HED's Residue Chemistry Chapter dated 12/2/97, Gowan submitted an acute dietary analysis using probabilistic (Monte Carlo) techniques. This submission has been reviewed and found to be inadequate. The analysis cannot be used for regulatory purposes because, among other things, it is based on the inappropriate exclusion of certain crops and the inappropriate use of residue and percent crop treated data.

RDI: BRSrSci:ANielsen

MEMORANDUM

DATE: 10/7/98

SUBJECT: OXYDEMETON-METHYL: HED Risk Assessment for the Reregistration Eligibility Decision (RED) Document. Chemical No. 058702. Case No. 0258. Barcode D249112.

FROM: Paula A. Deschamp, Risk Assessor
Reregistration Branch 2
Health Effects Division (7509C)

THROUGH: Alan P. Nielsen, Branch Senior Scientist
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TO: Cathy Monk/Kathleen Meier
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1.0 EXECUTIVE SUMMARY

The Health Effects Division (HED) has conducted a human health assessment for the active ingredient oxydemeton-methyl ((S-[2-(ethylsulfinyl)ethyl] O,O-dimethyl phosphorothioate) for the purposes of making a reregistration eligibility decision. Oxydemeton-methyl is a broad spectrum systemic organophosphate insecticide/acaricide registered for use to control many insects, primarily aphids, mites, and thrips. Registered use sites include terrestrial food crops (vegetable, field, tree fruit and nut crops) and terrestrial non-food crops (forestry uses). HED evaluated the toxicological, residue chemistry, and exposure data bases for oxydemeton-methyl and determined that the data are adequate to support reregistration. In making its determination of safety finding for health risks, HED considered potential dietary exposure of the general population to oxydemeton-methyl residues from food and drinking water. Since there are no registered uses of oxydemeton-methyl in residential settings, the aggregate assessment for the general population and specific subgroups includes only food and water exposures. HED also considered dermal and inhalation exposure to occupational pesticide handlers, mixers, loaders, applicators and post-application workers during harvesting activities.

A Special Review of oxydemeton-methyl was initiated in 1987 (PD 1, Federal Register Vol. 52, pg. 192, 10/5/87) due to concerns over reproductive effects and worker exposure. At the time the Special Review was initiated, Miles Inc. was the basic producer of oxydemeton-methyl. On September 1993, Miles requested voluntary cancellation of all oxydemeton-methyl products, and on June 1994, Miles submitted an application to transfer all products to Gowan Company. Gowan Company signed a Settlement Agreement with the Agency in September 1994. At the time that Miles requested voluntary cancellation of its products, the due dates for data to support reregistration of oxydemeton-methyl were and

subsequently lapsed. Therefore, the Agency required risk mitigation concessions from Gowan to allow oxydemeton-methyl products to remain on the market while the required data were being generated. Gowan agreed not to market oxydemeton-methyl on **citrus, field corn, popcorn, onions, pears, safflower, snap beans, sorghum, and turnips**. However, the tolerances were to be retained to allow these uses to be potentially reinstated after EPA's favorable review of the required data and completion of the dietary and worker risk assessments.

Aggregate chronic dietary risk estimates associated with the consumption of oxydemeton-methyl do not exceed HED's level of concern. In the absence of monitoring data, conservative estimates of exposure to oxydemeton-methyl residues in drinking water using modeled, screening-level inputs indicate that relative to exposure in food, residues in drinking water would not contribute significantly to chronic aggregate risk.

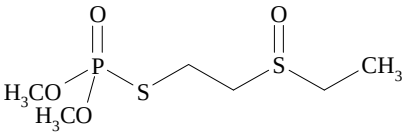
Aggregate acute dietary risk estimates were not completed because acute dietary risk estimates for exposure to oxydemeton-methyl in food alone exceeds HED's level of concern. Based on the available data, the estimated acute dietary risk associated with exposure to oxydemeton-methyl exceeds the Agency's level of concern for the general U.S. population and for population subgroups including infants <1 year old and children 1-6 years old. The acute dietary risk assessment was based on a Tier 1 assessment using high end tolerance-level residue estimates where 100% of the crop is assumed to be treated and a distribution of consumption data from the USDA 1977-78 Nationwide Food Consumption Survey. A probabilistic assessment of acute dietary exposure was reviewed and found inadequate for regulatory purposes. Additional probabilistic analysis to further refine the exposure assessment was not conducted by HED.

Occupational risk associated with certain mixer/loader/applicator scenarios exceeds HED's level of concern for short-term and intermediate-term risk in a variety of scenarios. For some scenarios involving application with a high-pressure handwand, low pressure handwand or backpack sprayer, further mitigation of risk using engineering controls is not feasible. No data were available to assess tree injection applications or mixing/loading/applying liquids using soil injection.

The product/residue chemistry, exposure, and toxicology database for oxydemeton-methyl is adequate to assess risk (dietary risk to the general U.S. population and dermal/inhalation risk of occupational workers) from the agricultural use of oxydemeton-methyl with a reasonable level of confidence; these data also support reregistration. Additional product and residue chemistry data that remain outstanding to meet guideline requirements are detailed in these disciplinary Chapters. Additional data identified as a data need to meet the requirements of FQPA (mouse specific locus test) are detailed in the HED's FQPA Safety Factor Recommendations (Combined Report of the HAIRC and Safety Factor Committee and its Recommendation for the Organophosphates) dated August 6, 1998.

2.0 PHYSICAL/CHEMICAL PROPERTIES CHARACTERIZATION

Oxydemeton-methyl (S-[2-(ethylsulfinyl)-ethyl] O,O-dimethyl phosphorothioate) is a phosphorothioloate, organophosphorous pesticide which is registered for use as a systemic acaricide and insecticide on a variety of food and non-food use sites.



Empirical Formula: $C_6H_{15}O_4PS_2$
Molecular Weight: 246.3
CAS Registry No.: 301-12-2
Shaughnessy No.: 058702

Oxydemeton-methyl is a colorless to amber-colored liquid with a boiling point of 106°C. It is miscible with water; readily soluble (10-100 g/100 mL) in dichloromethane, 2-propanol, and toluene; and practically insoluble (<1 g/100 mL) in n-hexane. The vapor pressure is 5.1×10^{-5} mbar at 25°C. Because oxydemeton-methyl pure active ingredient (PAI) and technical grade of the active ingredient (TGAI) are not stable, oxydemeton-methyl is diluted with solvent to form a 50% ai formulation intermediate (FI) which is used to produce end-use product formulations. Preliminary analysis of the FI indicates that there are no impurities present or formed that would be of known toxicological concern.

3.0 HAZARD CHARACTERIZATION

3.1 Hazard Profile

Oxydemeton-methyl is an organophosphorous insecticide. In all of the toxicological studies evaluated, the no observable effect level (NOEL) or lowest observable effect level (LOEL) was established by the inhibition of ChE. In acute toxicity studies with rats, oxydemeton-methyl exhibited high toxicity via the oral and dermal (Toxicity Category I) and inhalation (Toxicity Category II) routes of administration. In rabbits, oxydemeton-methyl exhibited minimal primary eye and dermal irritation. For the chronic toxicity studies in the rat and dog, the developmental studies in the rat and rabbit, the reproductive toxicity studies in the rat, and the acute and subchronic neurotoxicity studies in the rat, inhibition of brain ChE activity was observed at the LOEL in all of the studies.

In addition to ChE inhibition, the results of reproductive toxicity studies in the rat showed decreased male and female fertility of unknown origin. In these studies absolute ovarian and testicular weights were decreased; males also had a high incidence of epididymal vacuolation at histopathological examination. These findings, coupled with positive results found some of the mutagenicity tests, resulted in several non-guideline studies designed to evaluate and elucidate potential adverse effects of oxydemeton-methyl on reproduction, particularly in the male. These special studies included evaluation of the reversibility of epididymal vacuolation in rats, a reproductive toxicity study with treated males and untreated females, and the determination of sperm counts, morphology and motility.

Even though oxydemeton-methyl was found to produce reproductive toxicity, it was not a developmental toxicant. There is no indication of increased sensitivity of the offspring of rats or rabbits after pre-natal and/or postnatal exposure to oxydemeton-methyl. In developmental toxicity studies, in both the rat and rabbit, oxydemeton-methyl did not produce any developmental toxicity at doses which produced maternal toxicity. However, concern for possible adverse heritable effects is based on the *in vivo* mouse

spot test which was positive for the induction of somatic cell mutations following prenatal administration. Also, there was clear evidence of DNA strand breaks in rat testes cells in an in vitro alkaline elution assay (not confirmed in vivo). Based on this, HED's Hazard Identification Assessment Review Committee determined that the 10X FQPA safety factor should be retained and recommended a mouse specific locus test. Oxydemeton-methyl has been classified in "Group E" (i.e., the chemical is characterized as "Not Likely" to be carcinogenic in humans via relevant routes of exposure) because no compound-induced carcinogenic response was observed in mice or rats. In a metabolism study in the rat, urinary excretion was found to be the major route of elimination. In all, two major and five minor urinary metabolites were identified. Two of the minor metabolites, desmethyl ODM and desmethyl ODM sulfone, were believed to be biologically active and, in the absence of data to the contrary, were considered to be of toxicological concern. To resolve this question, the desmethylated metabolites were evaluated for their ability to inhibit brain ChE *in vitro*. In this study, brain ChE was not inhibited by either desmethyl ODM or desmethyl ODM sulfone over a wide concentration range; both oxydemeton-methyl and chlorpyrifos oxon (positive control) produced inhibition at very low concentrations.

3.2 Acute Toxicity

Acute toxicity values and categories for oxydemeton-methyl, technical and manufacturing product Metasystox-R™ [50% ai in methyl isobutyl ketone (MIBK), as a stabilizer], are summarized in the tables below. Oxydemeton-methyl technical is highly toxic (Toxicity Category I) via the oral and dermal routes of exposure. In a primary eye irritation study in rabbits, the technical was found to be slightly irritating (Toxicity Category III); however, the manufacturing product was found to be highly irritating (Toxicity Category I). The difference in this acute effect is likely due to the presence of a stabilizer.

Acute Toxicity of ODM, Technical and Manufacturing Product, Metasystox-R™

Study Type	Animal	Results	Tox Cat	MRID No
ODM, Technical				
81-1: Acute Oral	Rat	Female: LD_{50} = 48 mg/kg	I	40779801
81-2: Acute Dermal	Rat	Female: LD_{50} = 112 mg/kg	I	00143350
81-4: Primary Eye Irritation	Rabbit	Slightly irritating	III	00151801
81-5: Primary Dermal Irritation	Rabbit	Non-irritating	IV	00151801
81-6: Dermal Sensitization	Guinea Pig	Not a skin sensitizer (Beuhler)	N/A	40779802
Metasystox-R (50% a.i. in methyl isobutyl ketone)				
81-1: Acute Oral	Rat	Female: LD_{50} = 96 mg/kg	II	40779803C 40779803
81-2: Acute dermal	Rabbit	Male: LD_{50} = 844 mg/kg	II	40779804C 40779804
81-3: Acute Inhalation	Rat	Female: LC_{50} = 0.427 mg/L	II	40779805C 40779805
81-4: Primary Eye Irritation	Rabbit	Irritant (Probably caused by inerts)	I	40779806C 40779806
81-5: Primary Dermal Irritation	Rabbit	Very slightly irritating	IV	40779807C 40779807
81-6: Dermal Sensitization	Guinea Pig	Not a skin sensitizer (Beuhler)	N/A	40779802

3.3 FQPA Considerations

In acute and subchronic neurotoxicity studies in the rat, clinical signs of neurobehavioral toxicity and brain cholinesterase inhibition were observed; however, no treatment related histopathological effects were noted. In delayed neurotoxicity studies in the hen, clinical signs and biologically significant increases in the incidence of neurological lesions were found following a single dose (acute study); in the subchronic study only whole blood cholinesterase inhibition was noted. In developmental toxicity studies in the rat and rabbit, no developmental toxicity was observed at the highest doses tested, including inhibition of fetal brain ChE in the rat. In both of the 2-generation rat reproduction studies, reproductive toxicity was seen at doses which were the same or higher than maternally toxic doses. Based on the weight-of-the evidence of all available studies, HED's Hazard Identification Assessment Review Committee (HIARC) concluded that there was no increased susceptibility to rat and rabbit fetuses following *in utero* and/or post natal exposure to oxydemeton-methyl and determined that a developmental neurotoxicity study in rats is not required for oxydemeton-methyl.

In HED's FQPA Safety Factor Recommendations (Combined Report of the HAIRC and Safety Factor Committee and its Recommendation for the Organophosphates) dated August 6, 1998 it was recommended that the 10x FQPA safety factor be retained. Specifically for oxydemeton-methyl there is concern for heritable effects as demonstrated in an *in vivo* mouse spot test. This test was positive for the induction of somatic cell mutations following intrauterine exposure of embryos. This adverse effect is clearly associated with the developing embryos thus warranting the 10x safety factor. A reproducible, concentration-dependent increase in mutation was seen at doses lower than the level causing maternal toxicity. In addition, there was valid evidence of DNA strand breaks in rat testes cells in an *in vitro* alkaline elution assay (not confirmed *in vivo*). Based on these concerns, the HIARC required a mouse specific locus test (this requirement was "triggered" by the positive mouse spot test).

3.4 Endpoint Selection

The doses and toxicological endpoints selected for various exposure scenarios are summarized below.

EXPOSURE SCENARIO	DOSE (mg/kg/day)	ENDPOINT	STUDY
Acute Dietary	LOEL=2.5	Decreased RBC and brain ChE activity in males at day 0.	Acute Neurotoxicity in the rat
	UF=3000	**Acute RfD = 0.0008 mg/kg/day**	
Chronic Dietary	NOEL=0.05	Decreased plasma ChE	ChE study with human volunteers
	UF=100	**Chronic RfD = 0.0005 mg/kg/day**	
Carcinogenicity (Dietary)	OMD is classified as a **"Not Likely"** human carcinogen.		
Short-Term (Dermal)	NOEL=5.0	Decrease plasma, RBC and brain ChE	7-Day dermal toxicity study in the rat
	MOE = 100		
Intermediate-Term (Dermal)	NOEL=0.3	Decreased brain ChE	14-Day dermal toxicity study in the rat
	MOE = 100		
Inhalation (any time period)	LOEL = 0.177 mg/L	Clinical signs (tremors)	Acute Inhalation Study in the Rat
	MOE = 300		

For each of the exposure scenarios, toxicology endpoints have been selected for risk assessment purposes. The selected toxicology endpoints are consistent with organophosphate-induced toxicity (inhibition of ChE and resulting clinical signs of intoxication) and the studies selected are appropriate for each exposure scenario. The acute and chronic dietary RfDs are based on an acute neurotoxicity study, in which rats were orally gavaged once with oxydemeton-methyl, and a special ChE study in which human volunteers were given repeated oral doses of OMD. Special ChE dermal toxicity studies of 7 and 14-days duration, specifically address the short- and intermediate-term dermal exposure scenarios.

4.0 EXPOSURE AND RISK CHARACTERIZATION

4.1 Summary of Registered Uses

Oxydemeton-methyl is a restricted use pesticide. At this time, products containing oxydemeton-methyl are intended solely for occupational use. None of the registered occupational uses are likely to involve applications at residential sites. Oxydemeton-methyl is used to control aphids, mites, leafhoppers, thrips, corn rootworm beetles and lygus bugs on beans (lima), broccoli, broccoli raab, Brussels sprouts, cabbage, cauliflower, corn (sweet), cotton, cucumbers, eggplant, grapefruit, lemons, lettuce (head), melons (including muskmelons), oranges, peppermint, peppers, pumpkins, spearmint, squash (summer and winter), strawberries, sugar beets, walnuts, and watermelons. Oxydemeton-methyl is also registered for bark treatment on filberts, for treatment of nonbearing apples, apricots, cherries, crabapples, grapes,

nectarines, peaches, plums/prunes, and quinces, for treatment of alfalfa and clover seed crops, application to Christmas tree plantations, ornamental flowering plants, woody shrubs, and various ornamental and shade trees.

Oxydemeton-methyl is formulated as a 2 lb/gal emulsifiable concentrate (EC) formulation (25% ai) and as a liquid ready-to-use formulation (50% ai) for tree injections. Depending on the crop or site, up to three applications per season may be made using airblast sprayers, ground boom sprayers, or by bark treatment (e.g., brush-on or tree injection), soil injection and chemigation. Closed systems for mixing and loading must be used for all aerial application and chemigation systems.

4.2 Dietary Exposure

In metabolism studies with cabbage, sugar beets, and sweet corn, oxydemeton-methyl is converted to oxydemeton-methyl sulfone (ODMS), desmethyl ODM, and 2-ethylsulfinylethyl mercaptan. The sulfinyl mercaptan is oxidized to the sulfonyl mercaptan, and the latter dimerized to the disulfide or oxidized to 1-ethylsufonyl-2-methylsulfonyl ethane. ODMS demethylates to the desmethyl ODMS, and the latter forms a glucoside. A glucoside of the didesmethyl ODMS is also formed.

Tolerances for residues of oxydemeton-methyl in/on plant and animal commodities and processed food/feed items are presently expressed in terms of the combined residues of oxydemeton-methyl and its cholinesterase-inhibiting metabolites. Based on the available plant and animal metabolism studies, the HED Metabolism Committee determined that oxydemeton-methyl and oxydemeton-methyl sulfone (ODMS) are the residues to be regulated in plant commodities and that oxydemeton-methyl is the residue to be regulated in animal commodities. Adequate analytical methods are available for the purposes of tolerance enforcement (Pesticide Analytical Manual [PAM] Vol. II).

Residue data from crop field trials, processing studies, and livestock feeding studies have been reviewed for the purpose of tolerance reassessment. HED is recommending revocation of tolerances for certain commodities for one or more of the following reasons: (1) there are no longer significant livestock feed items for the commodity; (2) use on non-bearing fruit trees is a non-food use based on the current use pattern; (3) currently there are no registered uses; and (4) tolerances for commodities from crops which have been removed from Gowan's marketing label may be revoked pending the Agency's decision to reinstate these uses. Insufficient field trial data are available to reassess the tolerances for alfalfa, chaff, for seed; alfalfa, green; alfalfa hay, for seed; corn fodder; and corn, fresh (K+CWHR). Existing tolerances for these commodities have been used for dietary exposure estimates.

Dietary Exposure (food source): The acute and chronic dietary exposure assessment was conducted using the DRES (Dietary Risk Evaluation System) system and was based on the listing of tolerances under 40 CFR 180.330(a) and (b). Apples, grapes, plums (prunes), and apricots were excluded since the use pattern for these commodities is considered to be "nonfood". Blackberries, raspberries, potatoes, and peas were also excluded since use registrations are currently inactive. However, commodities deleted from the registrant's marketing label (citrus, field corn, popcorn, sorghum safflower, onions, pears, turnips, and snap beans) were retained in the risk assessment.

To assess chronic dietary risk, the DRES program calculates exposure based on average food consumption estimates (from the 1977-78 USDA NFC Survey) and on tolerances and/or appropriate anticipated residue estimates. Chronic dietary risk is expressed as a percent of the chronic Reference Dose and is estimated by the DRES system from the general U.S. population and 22 population sub-groups, including infants and children (which typically demonstrate the highest exposure). The DRES chronic dietary assessment for oxydemeton-methyl included use of percent crop treated data (BEAD memo by S. Wise, 9/17/97) and anticipated residues for milk based on average residues from livestock

feeding studies (HED memo by B. Crop-Kohlligian, 11/97). Where percent crop treated estimates indicated no oxydemeton-methyl use, a default minimum assumption of 1% crop treated was applied.

To assess acute dietary risk, the DRES program calculates total, one-day exposure based on the reported consumption of foods and uses an upper-end residue estimate (in this case tolerance level residues) for each food. The upper-end of the resultant exposure distribution is then compared to the acute Reference Dose. The DRES acute analysis estimates single-day exposures for the overall U.S. population and four subgroups (males 13+years, females 13+years, infants <1 year, and children 1-6 years). The analysis is based on individual food consumption as reported by respondents in the USDA 1977-78 Nationwide Food Consumption Survey. The DRES acute dietary assessment for oxydemeton-methyl is considered a screening (or Tier 1) method since it has included all commodities, residues are assumed to be at tolerance level, and actual percent usage on each crop is not factored in.

Dietary Exposure (drinking water source): At the present time, no monitoring data are available to perform a quantitative drinking water assessment for oxydemeton-methyl. However, the Environmental Fate and Effects Division (EFED) provided a screening level drinking water assessment (EFED memo by Costello and Wells, 9/11/97). This assessment utilized PRZM-EXAMS and SCI-GROW (Screening Concentrations in Ground Water) screening models to provide estimates of surface and ground water concentrations of oxydemeton-methyl. Based on laboratory studies, neither oxydemeton-methyl or its metabolite of toxicological concern, ODMS, is expected to persist in surface water or expected to leach to ground water. Thus, oxydemeton-methyl was used as a surrogate for ODMS in EFED's screening analyses.

Surface Water: The PRZM-EXAMS model predicts that oxydemeton-methyl surface water concentrations range from a peak of 33.7 μg/L to a 56-day average of 1.7 μg/L. These values represent upper-bound estimates of the concentrations that might be found in surface water due to use of oxydemeton-methyl based on simulations performed using the maximum application rates of 1.50-3.76 lb/ai/A applied three times/year with 7-14 day intervals between applications. The PRZM-EXAMS model estimates pesticide concentrations found in surface water up to 56 days from a single runoff event which accounts for spray drift from multiple applications. PRZM/EXAMS represents a 10-hectare field immediately adjacent to a 1-hectare pond that is 2-meter deep with no outlet. The pond receives a pesticide load from spray drift for each application plus what runs off in one rainfall event, usually two days after the last application. The amount of pesticide remaining on the field in the top 2.5 cm of soil and available for transport to the pond depends on the application rate, number of applications, interval between applications, incorporation depth, and degradation rate in soil. Spray drift is determined by method of application (5% drift for aerial spray and airblast, 1% for ground spray, no drift for soil incorporation).

Ground Water: The SCI-GROW model predicts an estimated maximum concentration in ground water of 0.008 μg/L. The SCI-GROW model is a screening model used to estimate concentrations of pesticide in ground water under "worst case" conditions. The SCI-GROW model is based on scaled groundwater concentration from ground water monitoring studies, environmental fate properties (aerobic soil metabolism half-lives and sorption coefficients) and application rates. The current version of SCI-GROW appears to provide realistic estimates of pesticide concentrations in shallow, highly vulnerable groundwater (i.e., sites with sandy soils and depth to groundwater of 10 to 20 feet).

4.3 Dietary Risk Characterization

The risk estimate for acute dietary exposure greatly exceeds HED's level of concern for existing uses

and uses planned for reinstatement by the registrant. Tolerance level residues which represent an upper-end residue estimate for currently registered commodities result in the following percent oxydemeton-methyl acute Reference Dose (RfD) estimates:

Overall U.S. population:	3,750
Infants <1 year old:	6,250
Children 1-6 years old:	5,000

These estimates result from comparison of the upper-end of the exposure distribution to the acute RfD. The oxydemeton-methyl acute Reference Dose is 0.0008 mg/kg/day (adjusted to include the FQPA factor), based on the LOEL 2.5 mg/kg/day from an acute neurotoxicity study in the rat which demonstrated plasma, RBC, and brain ChE inhibition. The uncertainty factor is 3,000 based on 10X for intra-species extrapolation, 10X for inter-species variability, 10X for a data gap in lieu of a specific locus text, and 3X for lack of a NOEL.

An acute dietary analysis using probabilistic (Monte Carlo) techniques was submitted to the Agency, reviewed, and found to be inadequate. Because the analysis is inadequate, based on the inappropriate exclusion of certain crops and the inappropriate use of residue and percent crop treated data, it cannot be used for regulatory purposes. HED does not have data to significantly alter this upper end residue estimate and recommends that the registrant modify and resubmit their probabilistic analysis.

The risk estimate for chronic dietary exposure from the registered uses of oxydemeton-methyl and the uses planned for reinstatement does not exceed HED's level of concern. The chronic dietary exposure analysis estimates that existing uses result in an anticipated residue concentration (ARC) which represents 38% of the RfD for the general U.S. population. The subgroup with the highest exposure, non-nursing infants (<1 year old), occupies 65% of the RfD. The chronic dietary exposure estimates represent a refinement of the Theoretical Maximum Residue Concentration (TMRC) risk assessment using percent crop treated data and anticipated residues in milk based on dairy cattle feeding study data. Chronic exposure estimates were compared to the oxydemeton-methyl chronic RfD of 0.0005 mg/kg/day (adjusted to include the FQPA factor). This RfD is based on a NOEL of 0.05 mg/kg/day from a study with human volunteers which demonstrated plasma ChE depression following oral dosing. The uncertainty factors are 10x for inter-species variability and 10x for a data gap in lieu of a specific locus test.

Dietary Risk (Drinking Water): Aggregate chronic dietary risk estimates associated with the consumption of oxydemeton-methyl residues in food and water do not exceed HED's level of concern. Although monitoring data on oxydemeton-methyl in drinking water were not available for this assessment, conservative estimates of exposure to oxydemeton-methyl in drinking water (Tier II PRZM-EXAMS) indicate that relative to exposure in food, residues in drinking water would not contribute significantly to chronic aggregate risk.

Chronic drinking water levels of comparison (DWLOC) were calculated based on the chronic dietary (food) exposure and default body weights and water consumption figures. The Agency's default body weights and water consumption values used to calculate DWLOCs are as follows: 70kg/2L (adult male), 60 kg/2L (adult female), and 10 kg/L (child). To calculate the DWLOC, the chronic dietary food exposure was subtracted from the RfD.

$$DWLOC_{chronic} = \frac{\text{[chronic water exposure (mg/kg/day) x (body weight)]}}{\text{[consumption (L) x } 10^{-3} \text{ mg/}\mu\text{g]}}$$

where chronic water exposure (mg/kg/day) = [RfD - (chronic food + residential exposure) (mg/kg/day)]

The results are summarized in the Table below:

Population Subgroup	PRZM-EXAMS (μg/L)	SCI-GROW (μg/L)	RfD (mg/kg/day)	Chronic Food Exposure (mg/kg/day)	Chronic Residential Exposure (mg/kg/day)	Chronic H_2O Exposure (mg/kg/day)	$DWLOC_{chronic}$ (μg/L)
Adult Male	1.7	0.008	0.0005	0.000153	0	0.00035	12
Adult Female	1.7	0.008	0.0005	0.0002	0	0.00030	9
Child	1.7	0.008	0.0005	0.000326	0	0.00017	2

Because acute dietary risk estimates from exposure to oxydemeton-methyl in food alone exceed HED's level of concern, any exposure through drinking water would only contribute more to an already unacceptable risk estimate from food, and result in an unacceptable aggregate acute dietary risk estimate.

4.4 Non-Dietary Exposure

Occupational exposure to oxydemeton-methyl residues can occur for pesticide handlers, mixers, loaders, applicators, and post-application workers during harvesting activities. Occupational workers are potentially exposed via dermal and inhalation routes. The exposure duration may be short-term (1 to 7 days) and intermediate-term (1 week to several months). A long term exposure duration is not expected for either applicators or post-application workers because the maximum number of applications is limited to three per season for most use sites and to one or two per season for the remaining use sites.

Handler Exposure: HED has identified 13 major exposure scenarios for which there is potential for occupational handler exposure during mixing, loading, and applying products containing oxydemeton-methyl to agricultural crops and to non-agricultural use sites. These occupational scenarios reflect a broad range of application equipment and use sites, and were classified as either short-term or intermediate term based primarily on the frequency of exposure. The estimated exposures considered baseline protection (long pants and a long-sleeved shirt, no gloves, and an open cab or tractor), additional personal protective equipment (PPE, which includes a double layer of clothing and gloves), and engineering controls (closed application and mixing system systems, and water soluble bags). NOTE: Exposure/risk estimates have been conducted for water soluble bags, gel packs for mitigation purposes only; this type of formulation packaging is not listed on the most current labels and development of such packaging may not be feasible.

None of the chemical specific handler studies submitted to the Agency were found to be acceptable for reregistration purposes. Therefore, an exposure assessment for each oxydemeton-methyl use scenario was developed, where appropriate data are available, using the Pesticide Handlers Exposure Database (PHED) Version 1.1. PHED is a generic database containing measured exposure data for workers involved in the handling or application of pesticides in the field (i.e., currently contains data for over 2,000 monitored exposure events). The basic assumption underlying the system is that exposure to pesticide handlers can be calculated using the monitored data as exposure is primarily a function of the physical parameters of the handling and application process (e.g. packaging type, application method, and clothing scenario). In addition to the generic surrogate task-based exposure data, the following assumptions and factors were used to complete the exposure assessment for oxydemeton-methyl:

- Maximum application rates and application frequency from product labels.
- Average body weight of an adult handler is 70 kg. This body weight is used since the

endpoint of concern is not sex-specific (i.e., the cholinesterase inhibition could be assumed to occur in males or females).

- Average work day interval represents an 8 hour workday (e.g., the acres treated or volume of spray solution prepared in a typical day).

- Daily acres and volumes (as appropriate) to be treated in each scenario include:

  -- 350 acres for aerial and chemigation applications (including flaggers supporting aerial applications);
  -- 80 acres for groundboom applications;
  -- 20 acres for airblast applications to tree crops
  -- 40 acres for airblast applications to grapes;;
  -- 20 acres for high-pressure handwand;
  -- 5-10 gallons per day for brush-on bark applications;
  -- 40 gallons per day for low-pressure handwand.

4.5 Non-Dietary (Dermal and Inhalation) Risk Characterization

Occupational Handlers (Mixer/Loader/Applicators): MOEs were derived based upon comparison of dermal exposure estimates against NOELs of 5 mg/kg/day for short-term exposure or 0.3 mg/kg/day for intermediate-term exposure. Both short and intermediate-term NOELs were from dermal toxicity studies in the rat. MOEs were also derived based upon comparison of inhalation exposure estimates against a LOEL of 0.177 mg/L (0.0989 mg ai/L or 17.02 mg/kg/day). Aggregate risk indices (ARIs) are used to combine dermal and inhalation MOEs in this assessment because the uncertainty factors are dissimilar. In this assessment, the dermal uncertainty factor is 100, while the uncertainty factor for inhalation is 300. The ARI normalizes all uncertainty factors to one; therefore, an ARI of less than one is indicative of a risk concern for adverse health effects.

A summary of the short-term and intermediate-term aggregate risk indices for baseline, additional PPE, and engineering controls is presented in the following table.

Short-term and Intermediate-term Aggregate Risk Indices for Baseline, Additional PPE, and Engineering Controls

Exposure Scenario (Scenario #)	Baseline					Additional PPE					Engineering Controls				
	Inhalation MOE [a]	Short-term		Intermediate-term		Inhalation MOE [a]	Short-term		Intermediate-term		Inhalation MOE [e]	Short-term		Intermediate-term	
		Dermal MOE [b]	ARI [c]	Dermal MOE [d]	ARI [c]		Dermal MOE [b]	ARI [c]	Dermal MOE [d]	ARI [c]		Dermal MOE [b]	ARI [c]	Dermal MOE [d]	ARI [c]
Mixer/Loader Exposure and Dose Levels															
Mixing/Loading Liquid Formulations for Aerial/Chemigation Application (1a)	2,800	0.34	0.0034	0.021	0.00021	2,800	59	0.55	3.5	0.035	41,000	120	1.2	7.0	0.07
	3,800	0.46	0.0046	0.028	0.00028	3,800	78	0.73	4.7	0.047	55,000	160	1.6	9.3	0.093
	7,600	0.92	0.0092	0.055	0.00055	7,600	160	1.5	9.4	0.094	110,000	310	3.1	19	0.19
Mixing/Loading Liquid Formulations for Groundboom Application (1b)	12,000	1.5	0.015	0.091	0.00091	12,000	260	2.4	15	0.15	180,000	510	5.1	31	0.31
	17,000	2.0	0.02	0.12	0.0012	17,000	340	3.2	21	0.21	240,000	680	6.7	41	0.41
	33,000	4.0	0.04	0.24	0.0024	33,000	690	6.5	41	0.41	480,000	1,400	14	81	0.81
Mixing/Loading Liquid Formulations for Airblast Sprayer (1c)	44,000	5.4	0.054	0.32	0.0032	44,000	920	8.7	55	0.55	640,000	1,800	18	110	1.1
	66,000	8.0	0.080	0.48	0.0048	66,000	1,400	13	82	0.82	960,000	2,700	27	160	1.6
Mixing/Loading Liquid Formulations for High-Pressure Handwand (1d)	44,000	5.4	0.054	0.32	0.0032	44,000	920	8.7	55	0.55	640,000	1,800	18	110	1.1
Mixing/Loading Water Soluble Bags (Gel Packs) for Aerial/Chemigation Application (2a)	See Engineering Controls			See Engineering Controls		See Engineering Controls			See Engineering Controls		19,000	63	0.62	3.8	0.038
											38,000	130	1.3	7.6	0.076
Mixing/Loading Water Soluble Bags (Gel Packs) for Groundboom Application (2b)											83,000	280	2.8	17	0.17
											170,000	560	5.5	33	0.33
Mixing/Loading Water Soluble Bags (Gel Packs) for Airblast Sprayer (2c)											220,000	740	7.3	44	0.44
											330,000	1,100	11	67	0.67
Mixing/Loading Water Soluble Bags (Gel Packs) for High-Pressure Handwand (2d)											220,000	740	7.3	44	0.44

Short-term and Intermediate-term Aggregate Risk Indices for Baseline, Additional PPE, and Engineering Controls

Exposure Scenario (Scenario #)	Baseline					Additional PPE					Engineering Controls				
	Inhalation MOE [a]	Short-term		Intermediate-term		Inhalation MOE [a]	Short-term		Intermediate-term		Inhalation MOE [e]	Short-term		Intermediate-term	
		Dermal MOE [b]	ARI [c]	Dermal MOE [d]	ARI [c]		Dermal MOE [b]	ARI [c]	Dermal MOE [d]	ARI [c]		Dermal MOE [b]	ARI [c]	Dermal MOE [d]	ARI [c]
Applicator Exposure and Dose Levels															
Applying Sprays with Fixed-wing Aircraft (3)	See Engineering Controls			See Engineering Controls		See Engineering Controls			See Engineering Controls		67,000	270	2.7	16	0.16
Applying Sprays with Helicopter Aircraft (4)	See Engineering Controls			See Engineering Controls		See Engineering Controls			See Engineering Controls		2,500,000	700	7.0	42	0.42
Applying Sprays with a Groundboom (5)	27,000	420	4.0	25	0.25	27,000	530	5.0	32	0.32	460,000	1,200	12	70	0.70
Applying Sprays Using an Airblast (6)	12,000	43	0.43	2.6	0.026	12,000	71	0.7	4.2	0.042	120,000	820	8.0	49	0.49
	18,000	65	0.64	3.9	0.039	18,000	110	1.1	6.4	0.064	180,000	1,200	12	74	0.74
Applying Using a High-Pressure Handwand (7)	670	8.6	0.083	0.52	0.0052	670	43	0.36	2.6	0.026	Not Feasible			Not Feasible	
Mixing/Loading/Applying Liquids as a Tree Bark Treatment Using a Paintbrush (8)	210	0.097	0.00097	0.0058	0.000058	210	0.80	0.0079	0.048	0.00048	Not Feasible			Not Feasible	
	430	0.19	0.0019	0.012	0.00012	430	1.6	0.016	0.095	0.00095	Not Feasible			Not Feasible	
Tree Injection (Ready-to-Use Liquid) (9)	No Data			No Data		No Data			No Data		No Data			No Data	
Mixer/Loader/Applicator Exposure and Dose Levels															
Soil Injection (10)	No Data			No Data		No Data			No Data		No Data			No Data	
Backpack Sprayer/Knapsack (11)	1,300	4.7	0.046	0.28	0.0028	1,300	73	0.072	0.44	0.0044	Not Feasible			Not Feasible	
Low Pressure Handwand (12)	1,300	0.12	0.0012	0.007	0.000070	1,300	32	0.3	1.9	0.019	Not Feasible			Not Feasible	
Flagger Exposure and Dose Levels															
Flagging Aerial (Sprays) (13)	13,000	120	1.2	7.3	0.073	13,000	130	1.3	8.0	0.08	650,000	6,100	59	360	3.6

Note: An ARI greater than 1 is considered acceptable.

a Baseline Inhalation MOEs from Table 5. Baseline inhalation MOEs were used to calculate both Baseline and Additional PPE ARIs because they were considered acceptable (i.e., greater than 300) without the addition of respirator protection factors.

b Short-term Dermal MOEs for Baseline, Additional PPE, and Engineering Controls from Table 3. Baseline dermal unit exposure represents long pants, long sleeve shirt, no gloves, open mixing/loading, and open cab tractor.

Additional PPE:

1a, 1b, 1c, 1d, 5, 6, 7, 8, 11, and 12:	double layer clothing (Protection Factor = 50% for the second layer) with chemical resistant gloves
13:	double layer clothing (Protection Factor = 50% for the second layer)

Engineering Controls:

1a. 1b, 1c, and 1d:	closed mixing system, single layer of clothing and chemical resistant gloves
2a, 2b, 2c, and 2d:	water soluble bags (gel packs), single layer clothing, chemical resistant gloves
3, 4:	enclosed cockpit, single layer clothing, and no gloves
5:	enclosed cab, single layer clothing, and no gloves
6:	enclosed cab, single layer clothing and chemical resistant gloves
13:	enclosed truck (Protection Factor = 98%), single layer clothing, no gloves

c Aggregate Risk Index = 1/{[1/(Dermal MOE/Dermal UF)] + [1/(Inhalation MOE/Inhalation UF)]} where an ARI greater than 1 is considered acceptable.

d Intermediate-term Dermal MOEs for Baseline, Additional PPE, and Engineering Controls from Table 4. Clothing scenarios are the same as those for short-term dermal MOE.

e Inhalation MOEs for Engineering Controls from Table 5.

Additional PPE:

8:	dust mist (D/M) respirator; the vapor pressure of ODM is 2.85 E-05 Torr at 20°C.

Engineering Controls:

1a, 1b, 1c, and 1d:	Closed mixing/loading system
2a, 2b, 2c, and 2d:	Water soluble bags or gel packs
3, 4 :	Enclosed cockpit
5, 6:	Enclosed cab
13:	Enclosed truck

Short-Term Risk Characterization: When short-term dermal and inhalation risks (MOEs) are combined and uncertainty factors are normalized as an ARI, all but two of the 13 major exposure scenarios reflecting baseline protective clothing result in exposure/risk margins which exceed HED's level of concern. For these two scenarios, (5) application of sprays with a groundboom and (13) flagging aerial sprays ARIs were >1 and <5. However those scenarios which exceed HED's level of concern, range from 1 to 3 orders of magnitude <1.

Short-term exposure and risk is mitigated by additional PPE for many of the remaining scenarios and the use of engineering controls, where feasible, further mitigates short-term exposure and risk resulting in ARIs >1. This leaves four scenarios where risk estimates, expressed as ARIs, exceed HED's level of concern: (7) applying liquids using a high pressure handwand, (8) mixing/loading/applying liquids as a tree bark treatment using a paint brush, and (11) backpack sprayer/knapsack, and (12) low pressure handwand.

Intermediate-Term Risk Characterization: When intermediate-term dermal and inhalation risks (MOEs) are combined and uncertainty factors are normalized as an ARI, all of the 13 major exposure scenarios reflecting baseline protective clothing and the use of additional PPE result in exposure/risk margins which exceed HED's level of concern. Using engineering controls where feasible, intermediate-term ARIs are >1 for only three scenarios. Intermediate-term risk estimates, expressed as ARIs, for all other scenarios exceed HED's level of concern.

A number of issues must be considered when interpreting the results of the occupational short- and intermediate-term risk assessment.

- Because the chemical-specific data for handler exposure did not meet guideline requirements (limited number of samples and high variability in the results), exposure analyses were completed using surrogate data from PHED. The standard exposure values (unit exposures for dermal and inhalation exposure) which serve as the basis for generic assessments using PHED, generally range from the geometric mean to the median of the measured residue values for the data set. Thus, these values are central tendency inputs.

- Several generic protection factors were used to calculate exposure where data sets did not reflect clothing scenarios appropriate to the baseline or PPE assessment. Generic protection factors were not necessary for the engineering control assessment.

- The relatively high exposures for tree bark painting compared with other scenarios, such as airblast application, reflect the relatively high magnitude of the unit exposure (mg per lb ai handled) in PHED for this scenario. The PHED scenario for painting was based on a fungicide applied at an average rate of 0.0510 lb ai per replicate. Extrapolating the monitored scenario of 0.0510 lb ai to the oxydemeton-methyl rate of 2.0 lb ai (max), the linear relationship assumed between exposure and lb ai handled may overestimate the risk.

- Recommended application rates vary by up to only a factor of two on the label (e.g. from 1.5 to 3 pints/acre), while for some crops only a single rate is listed. Thus the dermal exposure estimates should be considered close to typical, rather than conservative or "high-end" bounding-type estimates. Back-calculations indicate that in order for the intermediate-term dermal MOE to exceed 100 for airblast applicators in enclosed cabs and wearing chemical-resistant gloves, the number of acres treated would have to be no more than 9.8 at the maximum label rate, or 19.6 at one-half the maximum label rate.

4.6 Postapplication Exposure and Risk Characterization (Restricted-entry Intervals)

HED has determined that there is potential exposure to persons entering treated sites following application of oxydemeton-methyl-containing products for the purposes of:

- harvesting low growing fruits and vegetables;
- harvesting citrus fruit and high row crops such as sweet corn;
- scouting, weeding, hoeing, and other non-harvesting activities associated with low growing crops;
- pruning and thinning non-bearing fruit crops (including grapes) and other activities such as mechanical nut harvesting.

Current labels include a restricted-entry interval (REI) of 48 hour, or 72 hours for regions where average rainfall is less than 25 inches per year.

Postapplication scenarios were classified as intermediate-term (7days to several months) based primarily on the frequency of exposure. Workers are expected to be involved in postapplication activities such as harvesting, scouting, irrigating, etc. in various crops where exposure to oxydemeton-methyl-treated crops is likely to occur daily for 1 week to several months. This frequency of exposure is most likely to occur during hand harvesting of cole crops (cauliflower, broccoli, Brussels sprouts) where 51-100% of the crop is treated with oxydemeton-methyl. Only postapplication dermal exposure was assessed because postapplication inhalation exposure is expected to be negligible.

Four reentry studies (MRID 00158210 grapes; MRIDs 00158208 and 00158209 cauliflower and broccoli; MRID 43821401 cauliflower, cotton, bell peppers, and sugar beets) were conducted for oxydemeton-methyl formulated as Metasystox-R (a 25% ai EC). The HED reviews of three of the studies concluded that they do not meet the requirements of Subdivision K and the FIFRA "88 Acceptance Criteria due to a general lack of QA/QC data. Nonetheless, HED conducted a range-finding exercise to determine postapplication risks for harvesting grapes, cauliflower, broccoli, bell peppers, and sugar beets based on dislodgeable foliar residue (DFR) data from all four reentry studies. No data are available for other crops listed in the Summary of Registered Uses.

The following assumptions and factors were used to complete the postapplication exposure assessment:

- Default transfer coefficients (Tc) of 10,000 cm^2/hr for grape harvesters and 1,000 cm^2/hr for cauliflower/broccoli, bell peppers, and sugarbeet harvesters; both Tc values represent routine crop-production tasks such as scouting, hoeing, thinning, irrigating and harvesting activities.
- Average work day interval represents an 8 hour workday
- Average body weight of an adult postapplication worker is 70 kg.

MOEs for various REIs were derived by a comparison of dermal exposure estimates against a NOEL of 0.3 mg/kg/day for intermediate-term exposure. The intermediate-term NOEL was from a dermal toxicity study in the rat. An MOE $\geq$100 is generally considered to be less than HED's level of risk concern for postapplication exposure to oxydemeton-methyl. For most of the crops evaluated in these four studies, the MOEs were less than 100 (i.e., unacceptable) for reentry day 0 through 7. Details of this analysis may be found in the Occupational and Residential Chapter dated 8/3/98 and the results of the acceptable study (MRID 43821401) are presented in the following table.

Table 11. Postapplication Dose and MOE for Cauliflower/Cotton/Bell Pepper/Sugar Beet Harvesters (Reproduced from the Occupational and Residential Chapter dated 8/3/98).

Sampling Interval (Days)	Mean DFR (μg/cm^2)				Dermal Dose (mg/kg/day)[a]				MOE[b]			
	Cauli-flower	Cotton	Bell Pepper	Sugar Beets	Cauli-flower	Cotton	Bell Pepper	Sugar Beets	Cauli-flower	Cotton	Bell Pepper	Sugar Beets
0	0.277	0.422	1.849	6.174	0.032	0.048	0.21	0.71	9.5	6.2	1.4	0.43
1	0.050	0.286	1.794	4.073	0.0057	0.033	0.21	0.47	53	9.2	1.5	0.64
2	0.048	0.217	0.88	2.224	0.0055	0.025	0.10	0.25	55	12	3.0	1.2
5	0.022	0.034	0.644	NS	0.0025	0.0039	0.074	NS	120	77	4.1	NS
7	0.013	0.024	0.546	1.521	0.0015	0.0027	0.062	0.17	200	110	4.8	1.7
14	ND	ND	0.305	2.56	--	--	0.035	0.29	--	--	8.6	1.0
21	ND	ND	0.157	1.645	--	--	0.018	0.19	--	--	17	1.6
28	ND	ND	0.069	0.560	--	--	0.0079	0.064	--	--	38	4.7
35	ND	ND	0.053	0.189	--	--	0.0061	0.022	--	--	50	14

NS = not sampled ND = nondetected

Note: The LOQ value for cauliflower is 0.009 μg/cm^2; for cotton the LOQ is 0.013 μg/cm^2; and for both bell pepper and sugar beets the LOQ value is 0.020 μg/cm^2

[a] Dermal Dose (mg/kg/day) =([DFR (μg/cm^2]*[1,000 T_c (cm^2/hr)]*[1 mg/1,000 μg conversion]*[8 hr/day]/70 [Body Weight]
[B] MOE = NOEL (0.3 mg/kg/day)/Dermal Dose (mg/kg/day); MOE of 100 is necessary.

The results of the acceptable study (MRID 43821401) were also used to predict REIs for crops other than those tested. This additional analysis is not included in the Occupational Residential Chapter dated 8/3/98. The crops evaluated in the acceptable study included cotton, bell peppers, cauliflower, and sugar beets. Cotton and bell peppers were treated with the 2 lb/gal EC formulation at 0.5 lb ai/A/application applied two times at an interval of 14 days. Cauliflower and sugar beets were treated with the same formulation at 0.5 and 0.75 lb ai/A/application, respectively, applied three times at an interval of 10 to 14 days. Applications were made at the maximum registered use rate. Dislodgeable foliar residue (DFR) samples were collected from each crop at intervals from 1 hour to 35 days postapplication and analyzed for residues of oxydemeton-methyl and its sulfone metabolite. Climatological information, available for all crops except cauliflower, indicated no rainfall occurred during the sampling period.

The surrogate, rangefinding analysis conducted here utilizes regression-predicted 0-day DFR values based on values reported for cotton, bell peppers, cauliflower, and sugar beets to calculate an average percent initial DFR value (average of the calculated initial DFRs for each crop) and an average daily dissipation rate. The average initial DFR is 22 percent of the applied amount for the last application and the average dissipation rate is 21 percent per day. The results of this surrogate assessment, presented in the following table, indicate that MOEs for crops with low transfer coefficients (i.e., 1,000 cm^2/hr) and an application rate of 0.5 to 0.75 lb ai/A would be less than 100 until the 18th day after application. MOEs for crops such as grapes, with a high transfer coefficient (i.e. 10,000 cm^2/hr) and the same application rate, would be less than 100 until 27 days after application.

Average DFRs, Doses, and MOEs Based on Chemical-Specific Data (MRID No. 43821401)

Crop	cauliflower	cotton	bell pepper	sugar beet	Average	cauliflower	cotton	bell pepper	sugar beet	Average	cauliflower	cotton	bell pepper	sugar beet	Average
App. rate lb ai/A	0.5	0.5	0.5	0.75	0.5625	0.5	0.5	0.5	0.75	0.5625	0.5	0.5	0.5	0.75	0.5625
% initial DFR[a]	2%	8%	24%	52%	22%	2%	8%	24%	52%	22%	2%	8%	24%	52%	22%
dissipation /day	30%	36%	10%	7%	21%	30%	36%	10%	7%	21%	30%	36%	10%	7%	21%
DAT	DFR (ug/cm2)					Dose (mg/kg/day)					MOE[b]				
0	0.13	0.44	1.4	4.4	1.4	0.015	0.050	0.15	0.50	0.16	20	6.0	1.9	0.60	1.9
1	0.092	0.28	1.2	4.1	1.1	0.011	0.032	0.14	0.46	0.12	28	9.3	2.1	0.65	2.4
2	0.065	0.18	1.1	3.8	0.86	0.0074	0.021	0.13	0.43	0.10	41	14	2.4	0.70	3.1
3	0.045	0.12	1.0	3.5	0.68	0.0052	0.013	0.11	0.40	0.078	58	23	2.6	0.75	3.9
4	0.032	0.075	0.90	3.2	0.54	0.0036	0.0085	0.10	0.37	0.062	83	35	2.9	0.81	4.9
5	0.022	0.048	0.82	3.0	0.43	0.0025	0.0055	0.094	0.34	0.049	120	55	3.2	0.88	6.1
6	-	0.031	0.74	2.8	0.34	-	0.0035	0.085	0.32	0.039	-	85	3.5	0.94	7.7
7	-	0.020	0.67	2.6	0.27	-	0.0023	0.077	0.29	0.031	-	130	3.9	1.0	9.7
8	-	-	0.61	2.4	0.21	-	-	0.069	0.27	0.024	-	-	4.3	1.1	12
9	-	-	0.55	2.2	0.17	-	-	0.063	0.25	0.019	-	-	4.8	1.2	15
10	-	-	0.50	2.1	0.13	-	-	0.057	0.23	0.015	-	-	5.3	1.3	19
11	-	-	0.45	1.9	0.11	-	-	0.051	0.22	0.012	-	-	5.9	1.4	25
12	-	-	0.41	1.8	0.085	-	-	0.046	0.20	0.010	-	-	6.5	1.5	31
13	-	-	0.37	1.6	0.067	-	-	0.042	0.19	0.0077	-	-	7.2	1.6	39
14	-	-	0.33	1.5	0.053	-	-	0.038	0.17	0.0061	-	-	7.9	1.7	49
15	-	-	0.30	1.4	0.042	-	-	0.034	0.16	0.0048	-	-	8.7	1.9	62
16	-	-	0.27	1.3	0.034	-	-	0.031	0.15	0.0038	-	-	9.7	2.0	78
17	-	-	0.25	1.2	0.027	-	-	0.028	0.14	0.0030	-	-	11	2.2	98
18	-	-	0.22	1.1	0.021	-	-	0.025	0.13	0.0024	-	-	12	2.3	120
27	-	-	0.090	0.57	0.0026	-	-	0.010	0.065	0.00030	-	-	29	4.6	1000
40	-	-	0.024	0.21	-	-	-	0.0028	0.024	-	-	-	110	12	-
68	-	-	-	0.025	-	-	-	-	0.0029	-	-	-	-	100	-

a Percent initial DFR was based on the predicted day zero value divided by the final application; two applications of 0.5 lb ai/A to cotton and bell peppers at 14-day intervals, and three applications of 0.5 and 0.75 lb ai/A to cauliflower and sugar beets, respectively, at 10- to 14-day intervals.

b MOEs based on low-contact transfer coefficient (1,000 cm^2/hr). If high-contact transfer coefficient (10,000 cm^2/hr were used, MOEs would be one order of magnitude lower.

5.0 DATA NEEDS

Additional data requirements have been identified in the attached Science Chapters and are summarized here.

Toxicology Data for OPPTS Guidelines:

- No additional data are needed to satisfy standard Subdivision F. Guideline requirements.
- The HAIRC recommends a mouse specific locus test since oxydemeton-methyl was positive for the induction of germ cell genotoxicity.

Product and Residue Chemistry Data for OPPTS Guidelines:

Since a number of guideline requirements have been satisfy since completion of the Product and Residue Chemistry Chapters in 12/97, the current outstanding requirements are included here in their entirety.

860.1200 Label amendments are required for all ODM end-use products to specify that application using aerial equipment, when allowed, should be made in a minimum of 2 gal/A, or 10 gal/A for orchard crops.

860.1340 In conjunction with proposals for revised tolerances, the registrant must submit method validation data for corn forage, field corn grain, and walnuts at the revised tolerance levels

8860.1380 Sample storage intervals and conditions for all residue data submitted in support of tolerances must be supplied. In addition storage stability data are needed for processed commodities and livestock commodities.

860.1500 Additional field trial data depicting residues of ODM and ODMS in/on **sweet corn** are required to provide both adequate geographic representation and a greater number of results by which to judge possible variability.

No field trial data are available for **sorghum stover**. Geographically representative field trial data reflecting the maximum registered application rate must be submitted for sorghum stover before the reregistration requirements for magnitude of the residue in/on sorghum stover can be considered fulfilled.

Additional field trial data depicting residues of ODM and ODMS in/on **alfalfa forage and hay** are required to provide adequate geographic representation. In addition, because there is a registered use for ODM on alfalfa grown for seed, data are required for alfalfa seed.

No additional data are required for **cottonseed**. In lieu of conducting additional field trials depicting ODM residues of concern in/on cotton harvested 14 days following the last of three foliar applications at 0.5 lb ai/A, the registrant intends to amend the 2 lb/gal EC (EPA Reg. No. 10163-220) product label to allow only two applications per season at 0.5 lb ai/A. In addition, the registrant must remove the restriction against the grazing or feeding gin trash to dairy or meat animals from the product label; the Agency considers such restrictions to be impractical.

The Agency currently recognizes **cotton gin byproducts** (commonly called gin trash which include the plant residues from ginning cotton consisting of burrs, leaves, stems, lint, immature seeds, and sand and/or dirt) as a RAC (Table 1, OPPTS 860.1000). Data depicting the magnitude of ODM residues of concern in/on cotton gin byproducts following application(s) of a representative formulation according to the maximum registered use patterns are required. Cotton must be harvested by commercial equipment (stripper and mechanical picker) to provide an adequate representation of plant residue for the ginning process. A minimum of three field trials for each type of harvesting (stripper and mechanical picker) are required, for a total of six field trials. An appropriate tolerance for this RAC should be proposed once acceptable data have been submitted and evaluated.

- The need for additional data will be determined when HED and SRRD consider risk mitigation/regulatory options.

cc: (without attachments):
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